TABLE 1—HIGHEST PRIORITY RESEARCH ISSUES DETERMINED FROM 103 SPECIFIC IDENTIFIED NEEDS IN THE 2001 RESEARCH NEEDS ASSESSMENT CONDUCTED BY THE APHIS WS PROGRAM

BIRDS

Improve existing and investigate new methods to protect agricultural crops (e.g., sunflower, sprouting and ripening rice) from blackbird damage.
More specifically, needs were identified related to developing nonlethal techniques (e.g., repellants, frightening devices, barriers, habitat management, and reproductive inhibitors); improving lethal chemical tools (e.g., improve baiting strategy and enhance acceptability of DRC–1339—Starlicide®); and developing methods to estimate mortality or "take" of blackbirds during operational use of these tools for blackbird damage control in sunflowers and rice.

Conduct research on the impacts of fish-eating birds (primarily double-crested cormorants and American white pelicans) to the aquaculture and sport fish industries.
More specifically, needs were identified related to understanding cormorant depredation and impacts to sport fisheries (e.g., crappie, bass, and walleye), the crawfish industry, and other natural resources (e.g., roosting vegetation) and American white pelican impacts on sport fisheries and their local movement patterns in commercial aquaculture areas relative to both damage and transmission of catfish diseases. Additional needs were identified relating to developing new, nonlethal methods (e.g., repellants, behavior-contingent disruptive stimuli) to reduce these species' adverse impacts on commercial and sport fishery production.

Investigate hazards, solutions, and strategies to resolve bird and other wildlife problems at airports.
More specifically, needs were identified related to continuing investigations of nonlethal methods (specifically habitat management techniques) and initiating new investigations of nontraditional ecosystems, such as desert environments, as they relate to wildlife–aviation strike hazards.

Investigate the roosting preference, behavior, and dispersal techniques for crows and ravens in urban or suburban environments.

Investigate and develop new and improve existing tools and strategies to resolve the impacts of geese, gulls, and terns in a variety of urban or suburban situations.
More specifically, needs were identified related to developing efficient, longlasting damage-management techniques (e.g., barriers, harassment and hazing methods, contraceptives, Avitrol™, egg removal, and repellants), and addressing issues related to geese and human health and safety (e.g., potential disease transmission), gulls and urban property damage (e.g., using rooftops and landfills), and terns and natural resource impacts (e.g., predating salmon smolt).

Conduct research into understanding the problems and developing methods (e.g., harassment, taste repellants, toxicants) to reduce the negative impact of black vultures and turkey vultures on livestock production and property (e.g., homes, watercraft, and communication towers).

MAMMALS

Develop methods to protect timber and forest resources from wildlife damage.
More specifically, needs were identified related to evaluating existing and identifying new repellants and barriers, and assessing the economic implications of various mitigation methods and strategies.

Conduct research to understand and resolve the impact of beavers on aquatic ecosystems.
More specifically, needs were identified related to developing methods to census local beaver populations, describing and quantifying their economic impacts, and evaluating existing (e.g., repellants, barriers, lures, and toxicants) and alternative (e.g., relocation) management practices to reduce beaver damage to forest, agriculture, urban or suburban, and riverine environments.

Evaluate and develop tools and techniques for use in integrated pest management strategies for rodents in both agricultural and native habitat ecosystems.
More specifically, needs were identified related to evaluating ecologically sound and economically feasible methods (e.g., repellants, barriers, toxicants, odor and taste attractants, and microencapsulation methods) to reduce negative impacts of prairie dogs, rats, pocket gophers, and ground squirrels.

Conduct behavioral and techniques-development research for canids as related to developing effective predation damage-management programs for livestock in agricultural situations and for protecting human health and safety in urban or suburban situations.
More specifically, needs were identified related to improving existing and developing new alternative tools, using state-of-the-art technologies (e.g., improved capture devices such as snares and lives traps, reproductive inhibition techniques, vaccines and associated delivery systems, as well as selective attractants and repellants) for primarily coyotes, cougars, and bears in agricultural settings, and coyotes and fox in urban or suburban settings.

Examine the growing and expanding negative impact of predators (e.g., coyotes, foxes, wolves, and raccoons) on wildlife resources (e.g., deer and antelope), including, but not limited to, threatened and endangered species (e.g., sage grouse, turtles, terns, and rails).
More specifically, needs were identified related to evaluating existing and developing new, effective predation damage-management tools and strategies for use in these expanding, predator–wildlife conflict situations.

WILDLIFE DISEASES AND POPULATION MONITORING

Develop methods to survey and monitor emerging wildlife diseases and reduce the risks of the transmission of those that pose a threat to human health and safety and livestock production.
More specifically, needs were identified related to understanding the demography, movements, and behavior of raccoons and foxes as related to oral rabies vaccination programs, and deer and cattle as related to bovine tuberculosis transmission; and developing methods (e.g., barriers, reproductive inhibitors, and vaccines) to reduce the risk of disease transmission.

Develop methods to better monitor problem wildlife species populations as related to their economic impact, management effectiveness, and environmental mandates (e.g., National Environmental Protection Act [NEPA] requirements).
More specifically, needs were identified related to improving and/or developing practical methods to census overabundant wildlife populations, assess damage, determine "take," and quantify the effectiveness of management strategies (e.g., nonlethal *v.* lethal methods), with particular emphasis placed on those species most often addressed by the WS program (coyotes, blackbirds, and beavers).